

## **APPENDIX 3B-2**

**NOVEMBER 2005 PEER REVIEWER CHARGE:  
WATER AND ECOLOGICAL CONDITION**

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# **Charge for Peer Review of Eight Water and Ecological Condition Indicators for the U.S. Environmental Protection Agency's 2006 *Report on the Environment* Technical Document**

## **October 14, 2005**

The U.S. Environmental Protection Agency (EPA) has asked that independent peer reviewers critically review the indicators that the Agency proposes to use for its 2006 *Report on the Environment*—Technical Document (ROE06 TD). The purpose of this peer review is to ensure that the proposed indicators are appropriate, adequate, and useful for evaluating our nation's environment in general; useful for answering the questions posed in ROE06; meet technical requirements (including the indicator definition and criteria); are properly documented; and are scientifically sound. This charge provides background and instructions for peer review of eight indicators proposed as either: *water* indicators (two), *ecological condition* indicators (two), or both *water* and *ecological condition* indicators (four). It includes the following sections and attachments:

- Section 1: Background information on ROE06 TD
- Section 2: Indicator definition and criteria
- Section 3: Charge and review materials
- Attachment 1: Questions and Proposed Indicators for the ROE06 Technical Document as of October 14, 2005
- Attachment 2: Comment Sheet for All Indicators Except Sea Level and Sea Surface Temperature Indicators
- Attachment 3: Comment Sheet for Sea Level and Sea Surface Temperature Indicators
- Attachment 4: Indicator Materials for Review (included as subsequent sections of this binder).

## **Section 1: Background**

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In 2003, EPA published its first draft *Report on the Environment* (ROE03). ROE03 is a set of two question-driven reports comprising:

- A Technical Document (TD), which provides the scientific foundation for the ROE.
- A shorter Public Document that distills information in the TD for a non-technical audience.

These two reports were intended to identify and present the best available national-level indicators to help answer broad questions about the state of the nation's environment in five topic areas (chapters): air, water, land, human health, and ecological condition. In addition to reporting what we know, the ROE03 was also intended to point out where current data and understanding fall short of fully answering the questions in terms of delivering national, consistent, comprehensive data about the state of the nation's air, water, land, human health, and ecological condition. The ROE03 also presented some contextual information from other scientific sources in order to provide background and explain indicator data gaps.

EPA's Administrator has requested that the generation of Reports on the Environment be continued into the future. Current plans are for future reports to be developed on an approximately 3-year reporting cycle. To support the next anticipated ROE release in 2006, EPA has compiled a set of proposed indicators to help answer the questions posed for the 2006 Technical Document. EPA proposes reporting on both national-level indicators, national-level indicators that are provided at the scale of EPA regions, as well as several region-level indicators. As with ROE03, the questions are organized into five topic areas: air, water, land, human health, and ecological condition. There will be a separate chapter in the ROE06 Technical Document for each topic area. Each chapter will describe the set of questions for the topic area and the indicators that answer those questions.

Many of the indicators proposed for ROE06 were presented in ROE03, but some are new and others have new data sources. In addition, after refining the indicator definition and criteria (see boxes on the following pages), and applying both more consistently to the proposed indicator list, EPA recommends that some indicators from ROE03 not be presented in 2006.

To ensure that the indicators presented in the ROE06 TD are supported by data that are technically sound, meet the established indicator definition and criteria, and help answer the questions posed in the ROE, EPA has contracted with ERG to organize an independent peer review of the proposed ROE06 indicators. ERG organized a peer review of proposed indicators that took place on July 27-29, 2005. Since then, EPA has:

- Added four new national indicators, proposed for both water and ecological condition, for which data became available after the July peer review.
- Substantially revised two water indicators (one national indicator and one regional pilot indicator) that the peer reviewers recommended excluding from the ROE.
- Added two new ecological condition indicators.

EPA has contracted with ERG to organize a peer review of these eight new or substantially revised indicators. For this second peer review, which will be conducted via teleconference, reviewers are charged with three tasks:

- 1) Assess whether the proposed indicators are appropriate, adequate, and useful for evaluating and establishing an overall picture of our nation's waters and/or ecological condition.
- 2) Evaluate the proposed indicators with respect to their importance in terms of their ability to respond to the question(s) they are proposed to answer .
- 3) Evaluate the proposed indicators and their underlying data with respect to the ROE indicator definition and criteria presented below.

## Section 2: Indicator Definition and Criteria

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Each indicator in ROE06 should conform to the following definition.

### Definition: Indicator

For purposes of the ROE, an “indicator” is *a numerical value derived from actual measurements of a pressure, ambient condition, exposure, or human health or ecological condition over a specified geographic domain, whose trends over time represent or draw attention to underlying trends in the condition of the environment*. Indicators and their underlying data must meet criteria (see box below) for data quality, comparability, representativeness, and adequate coverage in time and space. Note that indicators rely on an underlying database or set of databases, but the databases themselves are not indicators.

In the above definition, “derived from” means that trends in *actual environmental observations* (e.g., rather than estimates or projections) must serve as the principal driver for trends in the indicators.

EPA has defined six indicator levels, as follows. Note that levels 1 and 2 are administrative indicators that measure progress in implementing environmental programs, and compliance with or response to those programs. They are *not* the subject of ROE06. Levels 3 through 6 indicators reflect environmental results/condition and are the subject of ROE06.

### Description of Indicator Levels

**Level 1 (Administrative—not covered by ROE06): Government Regulations/Activities.**

Examples: policy leadership, statutes, regulations, guidance, information.

**Level 2 (Administrative—not covered by ROE06): Actions/Responses by Regulated and Non-regulated Parties.** Examples: Pollution prevention and control, recycling, changes in consumer behavior, best management practices.

**Level 3 (Environmental): Changes in Pressure or Stressor Quantities.** Examples: Pollutants entering media, habitats altered or destroyed, hydrologic alteration.

**Level 4 (Environmental): Ambient Conditions.** Examples: Pollutant concentrations in media, food and drinking water, solid wastes in landfills, radiation; temperature, habitat condition, hydrology.

**Level 5 (Environmental): Exposure or Body Burden/Uptake.** Examples: Biological markers of uptake in people, plants, animals, or microorganisms.

**Level 6 (Environmental): Changes in Human Health or Ecological Condition.** Examples: Morbidity, mortality, biotic structure, and ecological processes.

Each indicator in ROE06 should conform to the following criteria:

### Indicator Criteria

- 1) The indicator makes an important contribution to answering a question for the ROE. (In this context, “important” means that the indicator answers a substantial portion of and/or a critical part of the question.)
- 2) The indicator is objective. It is developed and presented in an accurate, clear, complete, and unbiased manner.
- 3) The underlying data are characterized by sound collection methodologies, data management systems that protect their integrity, and quality assurance procedures.
- 4) Data are available to describe changes or trends, and the latest available data are timely.
- 5) The data are comparable across time and space, and representative of the target population. Trends depicted in this indicator accurately represent the underlying trends in the target population.
- 6) The indicator is transparent and reproducible. The specific data used and the specific assumptions, analytic methods, and statistical procedures employed are clearly stated.

### Section 3: Charge and Review Materials

Attachment 1 lists all the *proposed questions* and *associated indicators*, as of October 14, 2005, for the 2006 ROE by topic area. The eight indicators to be reviewed during this second peer review and the questions they are proposed to answer are:

Indicator Name	Water Question the Indicator Is Proposed to Answer	Ecological Condition Question the Indicator Is Proposed to Answer
Streambed Stability in Wadeable Streams (New)	What are the trends in extent and condition of fresh surface waters?	What are the trends in the critical physical and chemical attributes of the Nation’s ecological systems?
Nitrogen and Phosphorus in Wadeable Streams (New)	What are the trends in extent and condition of fresh surface waters?	What are the trends in the critical physical and chemical attributes of the Nation’s ecological systems?
Benthic Macroinvertebrates in Wadeable Streams (New)	What are the trends in extent and condition of fresh surface waters?	What are the trends in the diversity and biological balance of the Nation’s ecological systems?
Contaminants in Lake Fish Tissue (New)	What are the trends in the contamination/quality/safety of consumable fish and shellfish?	What are the trends in biomeasures of exposure to common environmental pollutants in plants and animals?

Coastal Sediment Quality (Revised)	What are the trends in extent and condition of coastal waters?	NA
Harmful Algal Bloom Outbreaks in the Gulf of Mexico (Region 4) (Revised)	What are the trends in extent and condition of coastal waters?	NA
Sea Level (New)	NA	What are the trends in the critical physical and chemical attributes of the Nation's ecological systems?
Sea Surface Temperature (New)	NA	What are the trends in the critical physical and chemical attributes of the Nation's ecological systems?

The materials and instructions for reviewing these indicators are provided below. The forms for your individual comments are provided as Attachments 2 and 3. The materials to be reviewed are provided in Attachment 4.

### Indicator Review

For each indicator, Attachment 4 provides:

- *Draft text* introducing the indicator, identifying the underlying data used to evaluate the indicator, and describing data interpretations. EPA proposes including this text in the ROE06 TD.
- *Draft graphic(s)/table(s)* to help readers visualize spatial and temporal trends in the indicator. EPA proposes including these graphics in the ROE06 TD.
- *An information quality review form* that presents detailed background information on the indicator and its supporting data (e.g., data quality, coverage, processing). EPA documents this information for the overall project record and to facilitate peer review of the indicators.

For the two revised indicators, Attachment 4 also provides:

- EPA's response to the peer reviewer consensus comments from the July 27-29, 2005, peer review.

Collectively, these items should adequately present each indicator and thoroughly document the information that EPA considered when evaluating the indicators for ROE06. For each indicator, you should thoroughly review the draft text, draft graphics/tables, and information quality review forms provided. Where available, please read EPA's response to the July peer review comments. Then, document your review comments by filling out the "Comment Sheet" in:

- Attachment 2 for all indicators *except* sea level and sea surface temperature.
- Attachment 3 for sea level and sea surface temperature.

These sheets ask you a series of questions about each indicator. Some of the questions ask you to provide a numerical response on a scale of 1 to 4 and then a written explanation of the rationale for your numerical response. For this review, you are asked to note which of your suggested changes to the indicator you consider to be “critical” (i.e., the indicator should not be included unless the change is made). (*NOTE: Question 3 on Attachment 2 applies only to the four indicators proposed to answer both a water question and an ecological condition question.*)

### **Preparing for the Peer Review Teleconference**

After receiving the reviewers’ individual comments, ERG will compile these comments and distribute them to all peer reviewers. Please familiarize yourself with the individual comments of the other peer reviewers prior to the teleconference.

Note that the individual comments are preliminary in nature and are intended to help initiate discussion during the teleconference. Reviewers may change their comments based on their discussions.



**Attachment 1:**

**Questions and Proposed Indicators (as of October 14, 2005) for the  
ROE06 Technical Document**

## Attachment 2: Comment Sheet for All Indicators *Except* Sea Level and Sea Surface Temperature

**Please fill out a separate sheet for each indicator. When suggesting specific changes to the indicator, please indicate which changes are “critical” (i.e., the indicator should not be included unless the change is made).**

Your Name: \_\_\_\_\_

Indicator Name: \_\_\_\_\_

- 1) Please indicate the extent to which you think the proposed indicator is appropriate, adequate, and useful (AA&U) for evaluating our nation’s waters and for contributing to an overall picture of our nation’s waters.

1	2	3	4
Indicator is not AA&U	Indicator is of somewhat AA&U	Indicator is largely AA&U	Indicator is completely AA&U

Comments:

- 2) Please indicate the extent to which you think the proposed indicator makes an important contribution to answering the ROE *water question* it is intended to answer (see table in charge for list of questions). (Note: An indicator may be judged less important if it makes a smaller or less critical contribution to answering the question posed than the other indicators, or if it covers an area of less or diminishing importance environmentally.)

1	2	3	4
Indicator is not important	Indicator is of minor importance	Indicator is important	Indicator is critical

Comments:

3) **FOR WADEABLE STREAMS AND LAKE FISH TISSUE INDICATORS ONLY**  
*(for coastal sediment and harmful algal blooms, skip to question 4):*

Please indicate the extent to which you think the proposed indicator makes an important contribution to answering the ROE **ecological condition question** it is intended to answer (see table in charge for list of questions). (Note: An indicator may be judged less important if it makes a smaller or less critical contribution to answering the question posed than the other indicators, or if it covers an area of less or diminishing importance environmentally.)

1	2	3	4
Indicator is not important	Indicator is of minor importance	Indicator is important	Indicator is critical

Comments:

4) To what extent do you think the indicator meets the following indicator definition:

*An “indicator” is a numerical value derived from actual measurements of a pressure, ambient condition, exposure, or human health or ecological condition over a specified geographic domain, whose trends over time represent or draw attention to underlying trends in the condition of the environment.*

1	2	3	4
Doesn't meet the definition	Only partly meets the definition	Largely meets the definition	Fully meets the definition

Please explain:

5) To what extent do you think the indicator meets each of the following indicator criteria:

- a) The indicator makes an important contribution to answering a question for the ROE. (In this context, “important” means that the indicator answers a substantial portion of and/or a critical part of the question.)

1  
Doesn't meet  
this criterion at all

2  
Only partly  
meets this criterion

3  
Largely meets  
this criterion

4  
Fully meets  
this criterion

- b) The indicator is objective. It is developed and presented in an accurate, clear, complete, and unbiased manner.

1  
Doesn't meet  
this criterion at all

2  
Only partly  
meets this criterion

3  
Largely meets  
this criterion

4  
Fully meets  
this criterion

- c) The underlying data are characterized by sound collection methodologies, data management systems that protect its integrity, and quality assurance procedures.

1  
Doesn't meet  
this criterion at all

2  
Only partly  
meets this criterion

3  
Largely meets  
this criterion

4  
Fully meets  
this criterion

- d) Data are available to describe changes or trends, and the latest available data are timely.

1  
Doesn't meet  
this criterion at all

2  
Only partly  
meets this criterion

3  
Largely meets  
this criterion

4  
Fully meets  
this criterion

- e) The data are comparable across time and space, and representative<sup>1</sup> of the target population. Trends depicted in this indicator accurately represent the underlying trends in the target population.

1  
Doesn't meet  
this criterion at all

2  
Only partly  
meets this criterion

3  
Largely meets  
this criterion

4  
Fully meets  
this criterion

- f) The indicator is transparent and reproducible. The specific data used and the specific assumptions, analytic methods, and statistical procedures employed are clearly stated.

1  
Doesn't meet  
this criterion at all

2  
Only partly  
meets this criterion

3  
Largely meets  
this criterion

4  
Fully meets  
this criterion

Please explain:

- 6) Do you have any suggestions for more effective graphic presentation of the data?  
If yes, please describe.

- 7) Please provide any additional comments, suggestions, or concerns regarding the indicator that you have not already noted in Questions 1 through 5. In particular, note any limitations to the indicator that you have not already described in your responses to the preceding questions.

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<sup>1</sup> An indicator seeks to describe trends in an overall target “population” (e.g., land area, type of surface water, type of emissions, U.S. population), yet data often can only be sampled from a subset of this population. The validity of the trends described by the indicator will depend on the degree to which the sampled population is representative of the target population.

8) Overall, this indicator:

\_\_\_\_\_ Should be included in ROE06 TD.

\_\_\_\_\_ Should be included in ROE06 TD only if the modifications identified above as critical are made.

\_\_\_\_\_ Should *not* be included in ROE06 TD.

### Attachment 3: Comment Sheet for Sea Level and Sea Surface Temperature Indicators

**Please fill out a separate sheet for each indicator. When suggesting specific changes to the indicator, please indicate which changes are “critical” (i.e., the indicator should not be included unless the change is made).**

Your Name: \_\_\_\_\_

Topic Area: **Ecological Condition**

Indicator Name: \_\_\_\_\_

- 1) Please indicate the extent to which you think the proposed indicator is appropriate, adequate, and useful (AA&U) for evaluating ecological conditions and therefore useful for contributing to an overall picture of ecological conditions.

1	2	3	4
Indicator is not AA&U	Indicator is of somewhat AA&U	Indicator is largely AA&U	Indicator is completely AA&U

Comments:

- 2) Please indicate the extent to which you think the proposed indicator makes an important contribution to answering the question: *What are the trends in the critical physical and chemical attributes of the Nation’s ecological systems?* (Note: An indicator may be judged less important if it makes a smaller or less critical contribution to answering the question posed than the other indicators, or if it covers an area of less or diminishing importance environmentally.)

1	2	3	4
Indicator is not important	Indicator is of minor importance	Indicator is important	Indicator is critical

Comments:

3) To what extent do you think the indicator meets the following indicator definition:

*An “indicator” is a numerical value derived from actual measurements of a pressure, ambient condition, exposure, or human health or ecological condition over a specified geographic domain, whose trends over time represent or draw attention to underlying trends in the condition of the environment.*

1	2	3	4
Doesn't meet the definition	Only partly meets the definition	Largely meets the definition	Fully meets the definition

Please explain:

4) To what extent do you think the indicator meets each of the following indicator criteria:

- a) The indicator makes an important contribution to answering a question for the ROE. (In this context, “important” means that the indicator answers a substantial portion of and/or a critical part of the question.)

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

- b) The indicator is objective. It is developed and presented in an accurate, clear, complete, and unbiased manner.

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

- c) The underlying data are characterized by sound collection methodologies, data management systems that protect its integrity, and quality assurance procedures.

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion



d) Data are available to describe changes or trends, and the latest available data are timely.

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

e) The data are comparable across time and space, and representative<sup>2</sup> of the target population. Trends depicted in this indicator accurately represent the underlying trends in the target population.

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

f) The indicator is transparent and reproducible. The specific data used and the specific assumptions, analytic methods, and statistical procedures employed are clearly stated.

1	2	3	4
Doesn't meet this criterion at all	Only partly meets this criterion	Largely meets this criterion	Fully meets this criterion

Please explain:

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<sup>2</sup> An indicator seeks to describe trends in an overall target “population” (e.g., land area, type of surface water, type of emissions, U.S. population), yet data often can only be sampled from a subset of this population. The validity of the trends described by the indicator will depend on the degree to which the sampled population is representative of the target population.

5) Do you have any suggestions for more effective graphic presentation of the data?  
If yes, please describe.

6) Please provide any additional comments, suggestions, or concerns regarding the indicator that you have not already noted in Questions 1 through 5. In particular, note any limitations to the indicator that you have not already described in your responses to the preceding questions.

7) Overall, this indicator:

\_\_\_\_\_ Should be included in ROE06 TD.

\_\_\_\_\_ Should be included in ROE06 TD only if the modifications identified above as critical are made.

\_\_\_\_\_ Should *not* be included in ROE06 TD.

## **Attachment 4: Indicator Materials for Review**

NOTE: ATTACHMENT 4 COMPRISES THE SUBSEQUENT SECTIONS OF THIS BINDER